

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In The Specification

On page 2, starting at line 10, please replace the paragraph with the following:

In other devices, data is moved from the cache to a non-volatile storage device to preserve the cache data through a system shutdown or power failure. However, in order to use the data that has been stored on the non-volatile storage device, the state of the cache or meta-data need to be preserved. If the state is not preserved the system still needs to re-initialize (often called warming) the cache because the state of data currently in the cache is unknown.

On pages 6, starting at line 9, please replace the paragraph with the following:

Figure 2 shows an exemplary layout of a non-volatile storage media 200 including a first section 210 and a second section 220. In the first section 210, the data with corresponding error correction code (ECC) can respectively be stored in cache lines “A,” “B,” “C,” “D” ... “x” with corresponding block addresses 0, 1, 2, 3...n. In the second section 220, metadata for cache lines “A,” “B,” “C,” “D” ... “x” with corresponding ECC can respectively be stored in block addresses “n+1,” “n+2”... “n+m.” Here, the ECC is for recovering the metadata stored in a corresponding block address. Also, although the non-volatile storage media 200 is shown ~~showne~~ to have a memory line of 512 bytes, the size of the cache line may vary depending upon the needs of the system 100.

On page 7, starting at line 14, please replace the paragraph with the following:

By storing both the metadata and the data on a non-volatile media, the state of the cache and its respective data can be accessed upon a system boot, resulting in a significant reduction of the initialization time for a cache. This is particularly useful as the size of the cache grows, for example, to a Gigabyte range. Also, storing the metadata and data on a non-volatile media would prevent data from being lost in a power failure if writes are to be cached.

On page 8, starting at line 13, please replace the paragraph with the following:

Typical cache devices are volatile and should be rebuilt (or rewarmed) on a next system boot. However, the storage and access method in accordance with the invention eliminates the need and time necessary to rebuild the cache on a system boot. By storing the metadata on a partitioned section of the non-volatile storage media, the state of the cache can correctly be determined on a next system boot. This enables the full benefit of having the cache pre-warmed or fully occupied with data, because the user data and program code is already stored in the faster cache from previous user sessions. As a result, the system performance is improved on the next system boot/power on and data written to the cache but not yet written to the disk is preserved.

In The Claims

- 1 36. (New) A method comprising:
 - 2 storing data in a non-volatile cache memory; and
 - 3 storing metadata corresponding to the data stored in the non-volatile cache memory.
- 1 37. (New) The method of claim 36, further comprising:
 - 2 updating the data and metadata atomically when a line of data in the non-volatile
 - 3 cache memory is changed.

1 38. (New) The method of claim 36, wherein the non-volatile cache memory is one of
2 a disk drive, a Flash memory, a ferroelectric random access memory, or a polymer ferroelectric
3 random access memory.

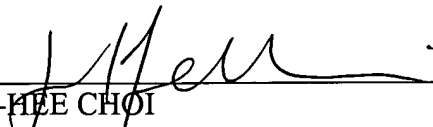
REMARKS

Applicants submit that no new matter has been added. Accordingly, entry of the amendments is respectfully requested.

Respectfully submitted,

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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231 on November 20, 2001.



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